UNITED STATES DISTRICT COURT
DISTRICT OF RHODE ISLAND

WANDA OVALLES, INDIVIDUALLY AND P.P.A A.O., AND WILSON OVALLES, Plaintiff, - against - SONY ELECTRONICS, INC., BEST BUY CO., INC., FOXCONN INTERNATIONAL, INC., AND JOHN DOE CORPORATIONS 1-4, Defendants.	Case No. 3:14-CV-137-M-PAS **DECLARATION OF <u>ROBERT MCCAUL</u>**

Robert McCaul, under penalty of perjury, declares:

1. I am employed by Sony Electronics Inc. ("SEL") as the Sales & Marketing Director for Sony's Energy products sold in the United States & Canada. I submit this Declaration in further opposition to "Plaintiffs' Motion to Strike Objections and Compel Supplemental Discovery Responses From Sony Electronics, Inc." (the "Motion"). I have personal knowledge of the facts and circumstances set forth herein.

2. I have been affiliated with SEL since April 1st, 2007. I have worked with other Sony companies in a sales & marketing capacity since December of 2003 with postings in both Japan and Europe before joining SEL. I currently manage one battery cell engineer, two engineering program managers, three marketing managers and two sales managers in my role at SEL. In addition, I am responsible for managing a separate power supply team.

3. In this Declaration, I will describe changes that Sony Energy Devices Corp. ("SEND") made to the design and manufacture of cylindrical lithium ion battery cells. But a bit of basic background might be useful to provide context for my explanation of those

changes. At the most general level (and subject to a great degree of variation with respect to design, composition and process), cylindrical lithium ion battery cells are manufactured by SEND as follows: *First*, large rolls of electrode material are manufactured – one roll for the cathode layer of the cell, and one roll for the anode layer of the cell. These rolls are manufactured by mixing together raw materials into an active mixture and then coating that active mixture onto either an aluminum foil (for the cathode) or onto copper foil (for the anode). *Second*, the rolls of electrode material are cut into small strips. *Third*, the small strips of electrode material are wound together, along with an insulating layer (called the separator) between the cathode layer and the anode layer. *Fourth*, the wound up roll is placed in a small, cylindrical metal can, which is then filled with electrolyte. And *fifth*, a cap is used to seal the cell. Cells are then shipped to a factory where they are then used to make a battery pack. (As a general matter, a battery pack is comprised of battery cells, electronics that manage the cells, plastic housing and terminals).

4. In the course of my work for SEL, I attended meetings with SEL's clients and customers during which we explained substantial changes to the design and manufacturing processes of cylindrical lithium ion battery cells manufactured by SEND implemented as part of SEND's safety and quality control processes. In particular, I recall attending meetings with representatives of Dell during which SEL described modifications to the cell design and manufacturing process to reduce as much as possible the risk of metal particulate contamination during the manufacturing process that created a risk of a short circuit in the battery cell.

5. To illustrate, in preparation for one such meeting with Dell, we developed materials that discussed many of the cell design and manufacturing changes that SEND had implemented to address the metal particulate contamination issue. While these materials were

prepared specifically for Dell, the design and manufacturing changes described apply to all cylindrical lithium ion cells later produced by SEND – whether they be for use in Dell, Sony VAIO, or other manufacturer's laptop computers. These changes were specifically to reduce the likelihood of contamination. In preparation for the meeting with Dell, we prepared a lengthy, detailed set of materials. I attach that set of materials as Exhibit A. At the meeting itself, we presented Dell with a more summary set of materials. I attach that set of materials as Exhibit B. These materials were prepared in connection with a meeting between SEL and Dell employees that took place on August 19, 2009.

6. The portion of the internal materials that details the design and manufacturing changes is on pages 78-92 of Exhibit A. I describe the changes reflected on those pages below.

7. In these materials, SEL describes four changes to the design of the battery cells that had already been implemented as of August 19, 2009. (Ex. A at 79).

8. First, we describe SEND's introduction of a higher strength separator to separate the cathode layer of the battery from the anode layer of the battery. The separator is necessary to prevent the cathode layer and the anode layer from coming into contact, which causes the battery to short circuit. The higher strength separator (as opposed to the lower strength separator that SEND had previously used) reduced the chance that a hard metallic particle of contamination could puncture the separator and lead to such an internal short circuiting event. (Ex. A at 79).

9. Second, we describe SEND's implementation of a contamination block system to the design of cells that it manufactured. This system laminates the sides of the separator in place. The anode and cathode plates are sandwiched between the layers of the

separator. By sealing the sides of the separator, it effectively blocks any contaminants from entering the cell. This laminated contamination block system provides a physical barrier to contamination. (Ex. A at 79).

10. Third, we discuss SEND's alteration of the cell design to add protection taping to the cathode layer of the cell. In the event that any metal particles managed to enter the cell, they would migrate to the end of the roll of electrode. We added the protection taping as an extra precaution to further prevent a contaminant particle from puncturing the separator and causing a short circuit. (Ex. A at 79).

11. Fourth, we detail SEND's modification of the composition of the anode tab at the bottom of the cell from nickel to copper. This design change was made because when the anode tab is spot welded into place, it is conceivable that minuscule metal particles can dislodge and cause contamination in the cell. The shape of a nickel particle is like a jagged rock – and if it contaminates the cell, it could conceivably puncture the separator and cause an internal short circuit. The shape of a copper particle is smooth – and if it contaminates the cell, it would not puncture the separator (and therefore not cause a short circuit). (Ex. A at 79).

12. In addition to design improvements, SEND also implemented hundreds of changes to the cell manufacturing process. (Ex. A at 92). In preparation for the meeting with Dell, we described just a few of those manufacturing improvements, as detailed below:

(i). SEND introduced a high density magnetic filter to trap any particles of iron or nickel in the active mixture that is later applied to the anode and cathode layers of the cell. The magnetic filter was added when the mixture leaves the mixing tank and moves down the line in the production chain, and it functions like a magnetized colander to trap

the microscopic iron or nickel particles that may have contaminated the active mixture. (Ex. A at 82).

(ii). SEND changed the rack units that hold the rolls of electrode material used to make the battery cells. The old rack was made of metal and had metal flanges. This created a risk that friction between the roll of electrode material and the metal flanges (or the metal rack itself) could cause the electrode material to dislodge particles of metal (causing contamination). The new racks had shelfs made of plastic in areas proximate to the roll of electrode material, and the width between the flanges was widened to eliminate the risk that the material would rub against the flange. (Ex. A at 83).

(iii). SEND added a real-time pressure monitor for the vacuum used to suck away any metal particles created during the process of ultrasonically welding the cap onto the battery cell. Although the vacuum itself had previously been a part of the manufacturing process, SEND added a pressure monitor to make sure that the vacuum suction was working properly and was sufficiently strong during the ultrasonic welding process. (Ex. A at 84).

(iv). SEND placed a plastic shield over the conveyers on which the rolls of battery material travel during the manufacturing process to prevent particulate contamination. (Ex. A at 85). It also added a shield when the top cap of the cell is welded to the battery cell for the same reason. (Ex. A at 86).

(v). SEND improved the effectiveness of the vacuum used to suck up any metallic particles created when a groove (sometimes called a bead) is made in the top of the battery cell can. Specifically, SEND changed the process so that a stream of air blows on the can to help release any particles of metal debris, as the vacuum works to suck up any such particles. (Ex. A at 87).

(vi). SEND enhanced its clean room practices and protocols during the manufacturing process – adding dedicated clean suits and clean shoes that must be worn in the "dry" room part of the cell assembly process, and the use of stickpads to remove debris on shoes upon entering and exiting the manufacturing area. (Ex. A at 88).

(vii). SEND also made many changes to the crane system on which the slitting machine (which contains the knife that cuts the sheets of anode and cathode material into much smaller pieces for use in the cells) is suspended. First, SEND changed the wheel that moves the machine into and out of position from metal (which could lead to potential contamination) to plastic. Second, SEND added a dustpan to catch anything that might fall from the rail that suspends and conveys the slitting machine. Third, SEND added a protective sleeve (also called an accordion part) over the metal cable that holds the slitting machine up – also to prevent metallic particle contamination. Finally, SEND changed the shape of the power supply (which moves the slitting machine into and out of position) to enhance its stability and reduce the chance of metal contamination as a result of wobbling. (Ex. A at 90).

(viii). In addition, SEND made changes to the winder – the machine that sandwiches the anode layer, the cathode layer, and the separator together into the cylindrical form that becomes the rolled battery cell. Specifically, SEND replaced some critical parts in the winder from metal to plastic to eliminate the likelihood of metal particulate contamination. (Ex. A at 91).

13. As the materials that SEL used at the meeting with Dell reflect, the changes described above in the cell design and cell manufacturing process were implemented by the end of 2008. (Ex. B at 45).

14. I am aware of a 2006 recall involving lithium ion battery cells manufactured by SEND. The battery cells at issue in that recall were G7 and G8 cells.

15. I am advised that the cells that were contained in the battery pack at issue in this action were G6G cells, manufactured by SEND, as opposed to the G7 and G8 cells that were subject to a recall in 2006 and other SEND battery cells going back to the year 2000 of which I am advised the plaintiffs are seeking discovery in this action. As reflected in Exhibit A, the G6G cell was still in the research and development phase as of August 19, 2009. (Ex. A at 5-6). The earliest date that the G6G cells went into production for eventual use by consumers was in the first half of 2010, *after* the design and manufacturing changes described in Exhibit A and in paragraphs 7-21above had already been put in place. (Ex. A at 5).

16. I declare under penalty of perjury that the foregoing is true and correct. Executed on March 11, 2016.

Robert McCaul

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